



(19)

JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: **02277253 A**

(43) Date of publication of application: **13.11.80**

(51) Int. Cl.

H01L 21/76

H01L 21/31

H01L 29/784

(21) Application number: **01099303**

(22) Date of filing: **18.04.89**

(71) Applicant: **MITSUBISHI ELECTRIC CORP**

(72) Inventor:
HAYASHIDE YOSHIO
MATSUURA MASAZUMI
WATABE KIYOTO
KAWAI KENJI

(54) **MANUFACTURE OF SEMICONDUCTOR DEVICE**

(57) **Abstract**

PURPOSE: To prevent an isolation characteristic and an element characteristic from being spoiled even when impurities are introduced after a rounding oxidation operation by a method wherein an impurity-contained film is formed in a groove formed in an element isolation region in such a way that it is thick at the bottom and thin at sidewall parts and, in addition, impurities are diffused thermally into the substrate.

CONSTITUTION: A mask 2 is formed on a silicon substrate 1; a groove part 3 is formed in the substrate by a dry etching operation; in addition, a rounding oxidation operation is executed at a high temperature to form an oxide film. Then, this oxide film is removed. The groove part 3 is obtained; it is coated with a silanol compound solution SOG containing boron; after that, a heat treatment is executed; the SOG is transformed into a glass film 8; then, its film thickness becomes thinnest at sidewall parts and thicker in the order of the surface of the substrate 1 and the bottom of the groove part 3. In this state, the glass film 8 on the surface of the substrate 1 is removed; during this process, the glass film 8 at the bottom of the groove part is not removed and is left; another heat treatment is executed; impurities in the glass film 8 are diffused into the substrate 1; a channel cutting

region 4 is formed; after that, the glass film 8 in the groove is removed; an oxide film 5 is deposited and the groove part 3 is filled. Thereby, an isolation characteristic and an element characteristic which are good can be made compatible.

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